



New records of *Vieira flinti* Sosa & Tauber, 2017 (Neuroptera, Chrysopidae) from Brazil

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Abstract

Vieira Navás, 1913 is a small genus of green lacewings of the Neotropical region with 5 recognized species. One species, *Vieira flinti* Sosa & Tauber, 2017, was recently described from Venezuela and northeastern Brazil. In this study, we record *V. flinti* for the first time in the states of São Paulo (at Piracicaba) and Mato Grosso do Sul (at Campo Grande) in the Southeast and Midwest regions of Brazil, respectively. Photographs and a distribution map are provided.

Key words

Chrysopinae; Belonopterygini; green lacewings; geographic distribution; Neotropical region.

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Introduction

Vieira Navás, 1913 (Neuroptera, Chrysopidae) is a small and Neotropical genus of lacewings (Sosa and Tauber 2017). This genus was originally included in the tribe Leucochrysini, but Tauber (2007) transferred it to the Belonopterygini based on morphological features of larvae and adults. Five species are recognized in the genus: *Vieira iridea* (Olivier, 1793) from Suriname, which was considered *nomen dubium* by Sosa and Tauber (2017); *Vieira brooksi* (Tauber, 2006) from Bolivia, Brazil, Panama, Venezuela, and possibly Costa Rica; *Vieira elegans* (Guérin Méneville, 1844) from Bolivia, Brazil, Guyana, Peru, Trinidad, and Venezuela; and *Vieira leschenaulti* (Navás, 1913) from Bolivia, Brazil, Colombia, Costa Rica, French Guiana, Peru, and Suriname (Brooks and Barnard 1990, Penny 2002, Tauber 2006, Tauber et al. 2006, Tauber 2007, Sosa and Tauber 2017).

The most recently described species is *Vieira flinti* Sosa & Tauber, 2017, originally recorded for Venezuela (Aragua and Yaracuy) and northeastern Brazil (Bahia) (Sosa and Tauber 2017). Here, we document new records of *V. flinti* from the states of São Paulo and Mato Grosso do Sul.

Methods

Two of our studied specimens were collected in Piracicaba, state of São Paulo, near of the Laboratório de Ecologia Química e Comportamento de Insetos-INCT, of Universidade de São Paulo (USP-ESALQ); a third specimen (previously collected in the state Mato Grosso do Sul) was found deposited in the entomological collection of Museu de Entomologia da ESALQ.

The *Vieira flinti* specimens were identified according Sosa and Tauber (2017), taxonomical key and the wing



Figure 1. Distribution map of *Vieira flinti* Sosa & Tauber, 2017: ● = previous records, ★ = new records.

terminology following Breitkreuz et al. (2017). The specimens were collected under the SISBIO permit #29705 and deposited in the Museu de Entomologia da ESALQ.

High-resolution photographs were taken in a stereomicroscope (Leica M205C) equipped with a Leica DFC 450 camera. Digital photographs were enhanced using Photoshop CS6.

Distribution maps were made using Quantum GIS 2.8. Longitude and latitude were obtained from specimen labels or estimated using gazetteers and maps. Localities of specimens were plotted on a world land projection using ESRI ArcView.

Results

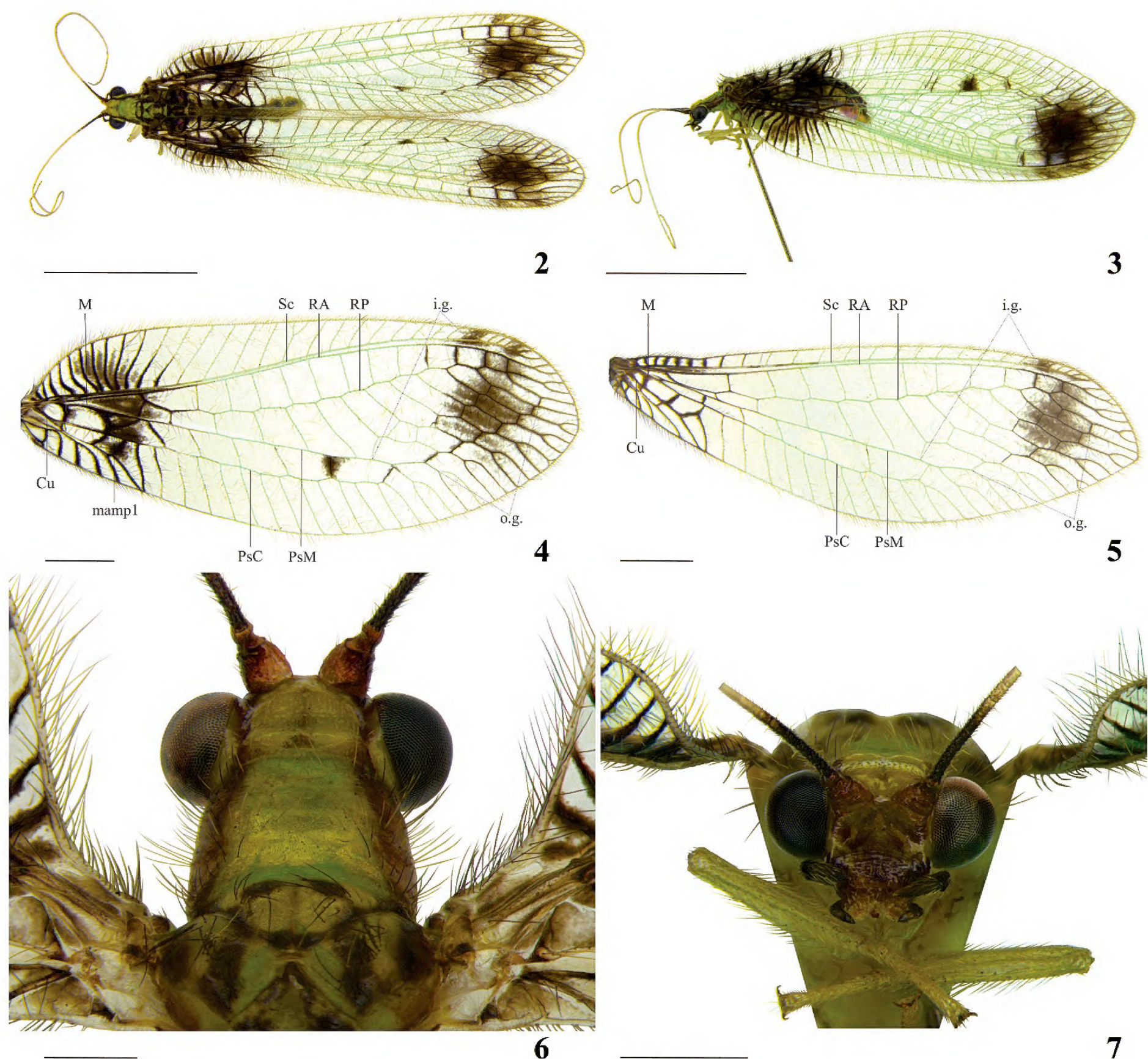
New records. Brazil: São Paulo: Piracicaba, Escola Superior de Agricultura “Luiz de Queiroz”, Universidade de São Paulo (ESALQ-LEA) (22°42'43.93" S, 47°37'42.61" W, 550 m elev.), 6 April 2018, R.C. Santos, 1 male (ESALQ6924-1). Brazil: São Paulo: Piracicaba, ESALQ-LEA (22°42'42.37" S, 047°37'41.67" W, 548 m elev.), 11 April 2018, H.L. Rainho, 1 female (ESALQ6924-2). Brazil: Mato Grosso do Sul: Campo Grande (20°25'40.40" S, 054°43'15.64" W), 22 April 2016, E.C. Lira, 1 female (ESALQ6924-3) (Fig. 1).

Vieira flinti was recorded from São Paulo and Mato Grosso do Sul for the first time, Southeast and Midwest regions of Brazil. The distances between the previous

locality, where the paratypes of *V. flinti* were collected in Brazil (Bahia) and the new records of our study are almost 1,700 km to Campo Grande and 1,175 km to Piracicaba. The distance of collection points between Campo Grande and Piracicaba is 776 km. In our opinion, this range of distribution is quite significant.

Of the 2 Piracicaba specimens of *V. flinti*, 1 specimen (ESALQ6924-1) was hand-collected on the lower surface of cabbage leaves, *Brassica oleracea* L. These same plants also contained the whitefly, *Bemisia tabaci* (Gennadius, 1889) (Hemiptera, Aleyrodidae). The other specimen of *V. flinti* was collected in a sentinel flight interception trap baited with sulcatol [(+) 6-methyl-5-hepten-2-ol] and sulcatone (6-methyl-5-hepten-2-one), attractant pheromones of ambrosia beetles (Coleoptera, Curculionidae, Scolytinae and Platypodinae). The capture of *V. flinti* by trap baited with these wood-boring beetles specific attractants was unexpected. To our knowledge, these pheromones have never been reported as attractants of lacewings. These pheromones probably do not have a biological role in the attraction of *V. flinti*, and in almost 1 year of monitoring at this Atlantic Rainforest remnant by sentinel traps, only 1 specimen of *V. flinti* was collected. The third record, from Mato Grosso do Sul, was from an earlier collection (not ours).

Identification. The genus *Vieira* is characterized by bodies with dark-brown or blackish marks, by forewings with large brown spots or streaks, and by having a series



Figures 2–7. Adult of *Vieira flinti* Sosa & Tauber, 2017. **2.** Habitus, dorsal. **3.** Habitus, lateral. **4.** Forewing. **5.** Hindwing. **6.** Prothorax, dorsal. **7.** Head, frontal. Abbreviations: Cu = cubitus, i.g. = intern gradates, M = medial, mamp1 = first intramedian cell, PsC = pseudocubital, PsM = pseudomedial, RA = radius anterior, RP = radius posterior, Sc = subcosta. Scale bars: Figs 2, 3 = 5 mm; Figs 4, 5 = 2 mm; Figs 6 = 0.5 mm; Fig. 7 = 1 mm.

of cross-veins forming a fan surrounded by dark-brown mark on the costal area of the wings (Sosa and Tauber 2017) (Figs 2, 3). According to Tauber et al. (2006), this pattern of dark brown on the body and wings make adults inconspicuous when they are resting on the undersides of mottled foliage in the forest. *Vieira flinti* is differentiated from other species of the genus by its large size, wings with white veins and diffuse patches of light-brown and brown venation, diffuse marks at the tips of the fore and hindwings that do not reach the wing margin, and the large mark on the forewing base that surrounds approximately 10 costal cross-veins and some medial and cubital cells (Sosa and Tauber 2017) (Figs 4, 5).

Specimens of *V. flinti* in this study are very similar to the original description of the species by Sosa and Tauber (2017) (Figs 2–7). However, the marks on the basal portion of scape and on the frons are almost fused in our specimens (Fig. 7), while in the original description,

they are separated. The wings do not show important variation in their membranes and dark-brown marks. The forewings (Fig. 4) have 3 prominent marks: 1 at the basal region of the wing, another connecting the distal part of inner and outer gradates and a third surrounding the penultimate cross-vein between the pseudoveins PsM (pseudomedial) and PsC (pseudocubital). The pterostigma has 2 well-defined dark-brown marks. The first intramedian cell (mamp1) is eutriangular and ovate. The hindwing (Fig. 5) has 2 dark-brown marks: the first at basal region of the wing and the second surrounding the distal part of inner and outer gradates. The pterostigma has only 1 dark-brown mark.

Discussion

The genus *Vieira*, 1913 has great importance for the understanding of phylogenetic relationships between the genera and tribes of the Chrysopidae, because it

was originally described as belonging to the tribe Leucochrysiini, probably because of the black marks on the wings (characteristic commonly found in the genera of this tribe), and then transferred to Belonopterygini tribe mainly due to the characteristics of its larvae, wings and male genitalia (Tauber 2006, Tauber et al. 2006, Tauber 2007, Sosa and Tauber 2017). All 5 species belonging to *Vieira* are found only in the tropical region, mainly in the North region of South America and all them except *V. iridea* occur in Brazil mainly in the north and southeast regions (Martins and Machado 2008).

The species most recently described *Vieira* is *V. flinti*, which was described based on the holotype (from Venezuela) and 3 paratypes (2 from Venezuela and 1 from Brazil). Recently, 3 specimens: 1 male and 1 female: from the city of Piracicaba (state of São Paulo) and 1 female from the city of Campo Grande (state of Mato Grosso do Sul) were found. These occurrences increase the number of Brazilian specimens of *V. flinti* from 1 to 4, as well as its distribution in 2 other Brazilian states (São Paulo and Mato Grosso do Sul) and 2 Brazilian regions (Southeast and Midwest). Our study, which provides the only male specimen reported from Brazil so far, demonstrates that the genus *Vieira* is more diverse and has a greater distribution than originally believed; this agrees with the observations of Sosa and Tauber (2017). Therefore, we recommend that more fieldwork be carried out in other states of the Brazilian Midwest, Northeast and Southeast regions, with the aim of finding other species of *Vieira* and possibly expanding the information for those already reported.

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Author's Contributions

MS and CCM identified and prepared the specimens; HLR and RCS collected the Piracicaba specimens and took the high-resolution photographs; MS made the distribution map; MS, CCM, HLR, and RCS wrote the text.

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